APPLICATION STORY

FLIR GF346

OPTICAL GAS IMAGING FOR THE AUTOMOTIVE INDUSTRY

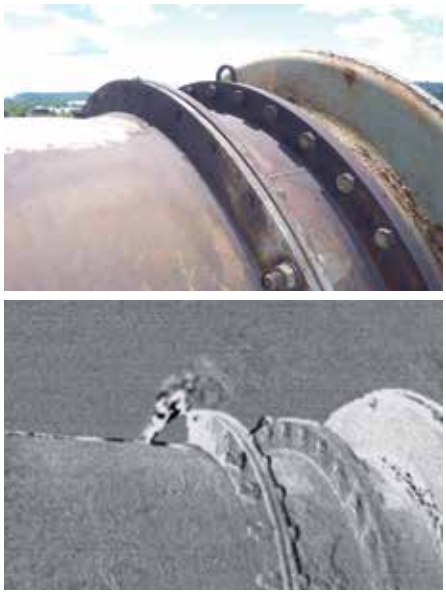
Optical gas imaging cameras are a proven technology to detect dangerous and costly gas leaks. Optical gas imaging technology has been successfully applied in the oil refining, chemical, petrochemical and many other industries to help improve worker safety and prevent costly production shutdowns. In other industries, like automotive manufacturing, leak detection with optical gas imaging cameras is still a relatively unknown method. Unfairly so, because this industry also works with the same gases, and therefore, it is confronted with the same safety and efficiency issues.

Just like the above-mentioned industries, the automotive industry often works with chemical compounds and gases that are invisible to the naked eye. When leaks of volatile gaseous compounds occur, then companies often turn to traditional detection methods, like sniffers and probes. The limitations of these methods are that they are time consuming and run a risk of missing gas leaks. They may even expose inspectors to invisible and potentially harmful chemicals.

Although still not very common in the automotive industry, gas detection cameras are a great way to visualize gas by utilizing the physics of fugitive gas leaks. The camera produces a full picture of the scanned area and leaks appear as smoke on the camera's viewfinder or LCD. The key success factors of optical gas imaging cameras for businesses today are safety, efficiency and profitability.

SAFETY

First of all, a gas detection camera is a quick, non-contact measuring instrument that can be used in hard-to-access locations. It can detect small leaks from several meters away and big leaks from hundreds of meters away. This way, an operator does not need to approach the leak from close by, which improves the safety significantly.



Natural gases like methane and ethane are clearly detectable with a mid-wave camera, like the FLIR GF320.

(COST-)EFFICIENCY

Working with sniffers or probes can be very time-consuming and a lot of the time spent inspecting installations that are safe and leak-free is wasted. Gas detection cameras provide a complete picture and can immediately exclude areas that do not need any action. This means enormous savings in terms of time and personnel. Another advantage is that systems do not have to be shut down during the inspection, which can result in huge

A FLIR GF306 can easily detect ammonia gases escaping from a gas nitriding furnace.

savings (sometimes up to 30,000 euros per day) or per equipment unit.

IMPROVING WORKPLACE SAFETY

Gas imaging cameras are an efficient way to inspect the workplace for leaks. This can especially be useful in foundries where automotive parts are being cast, such as gearboxes or brake discs. In a number of processes in metal casting and in metal hardening, potentially significant amounts of carbon monoxide (CO) can be generated. CO is a colorless, odorless gas usually formed during the combustion process. Workers on charging platforms or catwalks can unknowingly breathe high concentrations of this colorless, odorless gas, causing the worker to suddenly lose consciousness. High concentrations may even prove fatal without any warning symptoms.

Frank Zahorski, CEO of Itema GmbH, a German service company specialized in thermographic inspections, has experienced the dangers of carbon monoxide on the workfloor: "Our company was called in by a major automotive manufacturer, for the inspection of a workplace where metal casting takes place. We used the FLIR GF346 optical gas imaging camera to inspect the area and we quickly noticed that there were huge concentrations of carbon monoxide, far above the allowed level. Within only 30 minutes' time, we were able to discover a leak the size of a coin, in an installation that was subject to corrosion. We were able to present the company with a complete repair list, in a very short time frame."

MONITORING NITRIDING EQUIPMENT

Nitriding is a heat treating process that diffuses nitrogen into the surface of a metal to create a case-hardened surface. The process is used a lot in the automotive industry in the production of parts, such as gears, crankshafts and camshafts. In gas nitriding, the donor is a nitrogen rich gas, usually ammonia (NH3). When ammonia comes into contact with the heated work piece it disassociates into nitrogen and hydrogen. The nitrogen then diffuses onto the surface of the material creating a nitride layer.

Although ammonia is not especially toxic, it can be harmful when inhaled in large quantities. Also, mixtures of 15 to 25% ammonia in air are explosive if ignited by a spark. That is why it is extremely important to detect ammonia gases escaping from the gas nitriding furnace. Dedicated optical gas imagers, such as the FLIR GF306 camera, can detect and visualize these harmful gases quickly from a safe distance and without the need to interrupt the production process.

LEAK TIGHTNESS TESTING

For automotive parts, leak testing is an essential part of quality assurance testing. It ensures that flammable, toxic or corrosive substances remain within an object, or it can make certain that outside elements, such as water, cannot get inside the product. Leak testing also ensures that a liquid or gas that is essential to the function of a system, such as brakes, air conditioners or hydraulic valves, is contained within that system. A variety of leak testing methods are available, of which water dunk testing is one. Although popular in many industries, water dunking is not always feasible with automotive parts, especially when electronic components are involved.

In recent years, testing with tracer gases has proven to be the most effective method for detecting and measuring leaks. Helium is a commonly used tracer gas for leak testing, because it is the lightest of the inert gases and mass spectrometers are extremely sensitive to trace amounts. However, this method also has some drawbacks. A mass spectrometer is a delicate piece of equipment and expensive to maintain. Also the helium gas itself is expensive and highly viscous. If it spills, it can be difficult to clear from the testing equipment.

In contrast to helium, using carbon dioxide (CO2) as a tracer gas is considered as a relatively inexpensive procedure for tightness testing. The method is also reliable, can be used to test complex equipment, and CO2 is easy to obtain. With optical gas imaging cameras, like the FLIR GF343, you can see CO2 leaks quickly, easily, and from a safe distance.

MONITORING GAS DISTRIBUTION INSTALLATIONS

Optical gas imaging cameras are also an efficient way to monitor gas distribution installations. Natural gas consists mainly of methane and ethane, both of which are clearly detectable with a mid-wave camera, like the FLIR GF320. This infrared camera can rapidly scan large areas and pinpoint leaks in real time. It is ideal for monitoring plants that are difficult to reach with contact measurement tools.

For more information about thermal imaging cameras or about this application, please visit:

www.flir.com/ogi

The images displayed may not be representative of the actual resolution of the camera shown. Images for illustrative purposes only.